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ASSOCIATION OF C-REACTIVE PROTEIN AND METABOLIC SYNDROME IN RELATION TO AGE, GENDER AND DURATION

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Abstract:

Objective: *To determine the association between C-reactive protein and metabolic syndrome in relation to age gender and duration.*

Patients and Methods: *This cross sectional descriptive study of six months study was conducted at Liaquat University Hospital Hyderabad from 01-July-2013 to 31-Dec-2013. All the patients of 20 to 60 years of age presented with symptoms of metabolic syndrome for more than 01 year duration were admitted and evaluated for C-reactive protein. The data was analyzed in SPSS and the frequency and percentage was calculated.*

Results: *During six month study period, total 142 patients (93 females and 49 males) with metabolic syndrome were evaluated for C-reactive protein. Majority of patients were from urban areas 103/142 (72.5%). The mean ±SD for age of patients with metabolic syndrome was 42.63±8.82. The mean age ±SD of patient with raised CRP was 45.86±7.21. The mean circumference for males and female patients with raised CRP was 49.53±3.73 and 46.89±4.32 while the TG for males and female patients with raised CRP was 187.82±4.61 and 191.32±3.84 whereas the HDL-C for males and female patients with raised CRP was 30.74±2.31 and 26.75±2.51 respectively. The mean ± SD for systolic and diastolic blood pressure of males and female patients with raised CRP was 145±3.32 and 100.52±2.61 while the fasting blood glucose level for males and female patients with raised CRP was 135.42±2.53 and 146.53±6.54 whereas the CRP for male and female patients with raised CRP was 3.82±1.21 and 5.9±1.73 respectively. The majority of subjects from 40-49 years of age group with female predominance (p = <0.01) while the CRP was raised in 98(69%) patients in relation to age (p=<0.01) and gender (p=<0.01) respectively. Of 98 subjects with raised CRP 73 were females and 25 were males (p=0.01).*

Conclusion: *The raised CRP was observed in patients with metabolic syndrome.*

Key Words: *Metabolic syndrome, C-reactive protein*

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INTRODUCTION:

Metabolic syndrome includes increase blood sugar level and blood pressure, raised serum triglycerides, increase waist circumference & decrease high-density lipoprotein cholesterol (HDL-C). [1-3] The insulin resistance reveals the pathophysiological process and responsible for this syndrome and also future cardiovascular adverse events. [4,5] The reported prevalence for metabolic syndrome in was 46% [6], of which hypertension 25%, waist circumference 30%, reduced HDL-C 89%, hyperglycemia 7% and raised triglycerides 14%.[7,8]

C-reactive protein (CRP) is acute inflammatory reactant produced by liver cells while the metabolic syndrome labeled as proinflammatory state and estimation of C-reactive protein (CRP) can predict the future cardiovascular adverse events and diabetes mellitus in individuals had metabolic syndrome. [9, 10] The adipose tissue produces cytokines as interleukin 6 (IL-6) that maintains CRP formation by liver and modulate its plasma concentration according to the inflammatory state in the body. [11-15] The reported prevalence for raised C-reactive protein in metabolic syndrome was 38%.[16] Thus, there was no former local study was conducted on this topic, there by considering such theme in mind the present study was planned to conduct at tertiary care hospital Hyderabad so that by early evolution the one can reduce the future cardiovascular and cerebrovascular adverse events.

PATIENTS AND METHODS:

By considering the reported prevalence the cross sectional study was planned to conducted at tertiary care hospital with specific inclusion criteria as the individuals diagnosed as case of metabolic syndrome for more than one year duration, either gender and of 20-60 years of age whereas the exclusion criteria were the patients with renal & thyroid disorders, cardiac failure, liver disorders, malignancy, autoimmune disorders, rheumatic fever, infectious disorders (infectious mononucleosis, meningitis, syphilis and poliomyelitis), rheumatoid and septic arthritis, cerebrovascular accident (CVA), acute myocardial infarction and the individuals already on antibiotic therapy. The patients with symptoms of metabolic syndrome were enroll and entered in the study after taken the consent for the study. The methods for evaluation of component of metabolic syndrome were; (1) waist circumference (2) blood pressure (3) evaluation of triglycerides, high density lipoprotein (HDL) cholesterol and fasting blood sugar level, After confirmation of metabolic syndrome, the CRP was estimated by taken 2cc venous blood sample and sent to laboratory for evaluate the CRP levels (the serum CRP >1.0 mg/dL was taken as increase / raised / elevated). The data was collected while the frequency and percentage (%) and mean ±SD were computed in SPSS 21.

RESULTS:

Total 142 individuals with metabolic syndrome were explored for C-reactive protein. 72.5% patients were belonged to rural areas while the mean ±SD for age (years) of whole population, waist circumferences (inches) for male and female population, triglycerides (mg/dl) for male and female population, HDL (mg/dl) & FBS (mg/dl) for male and female population, the systolic (mmHg) and diastolic (mmHg) blood pressure in individuals with metabolic syndrome was 42.63±8.82 (years), 48.73±5.42 and 44.83±3.75, 183.53±7.83 and 194.42±5.94, 28.52±8.64 and 24.73±6.64, 130.52±3.32 and 148±2.52, 150.62±10.32 and 100.32±5.41. The mean ±SD of CRP was 5.3±1.32 whereas mean ± SD of raised CRP in male and female population was 3.82±1.21 and 5.9±1.73 respectively. The cross tabulation for age, gender and duration of disease are demonstrated in Table 1-3.

TABLE 01: THE AGE AND GENDER FOR STUDY POPULATION

		Gender		Total	P-value
		Female	Male		
AGE (yrs)	20-29	11	11	22	
		11.8%	22.4%	15.5%	
	30-39	23	17	40	
		24.7%	34.7%	28.2%	<0.01
	40-49	52	6	58	
		55.9%	12.2%	40.8%	
	50-60	7	15	22	
		7.5%	30.6%	15.5%	
Total		93	49	142	
		100.0%	100.0%	100.0%	

*P-value is statistically significant

TABLE 02: THE DISTRIBUTION FOR GENDER AND C-REACTIVE PROTEIN

		CRP		Total	P-value
		Raised	**Normal**		
Gender	**Female**	73	20	93	
		74.5%	45.5%	65.5%	
	Male	25	24	49	<0.01*
		25.5%	54.5%	34.5%	
Total		98	44	142	
		100.0%	100.0%	100.0%	

*P-value is significant

TABLE 03: THE DISTRIBUTION OF C REACTIVE PROTEIN AND DURATION OF THE DISEASE

		CRP		Total	P-value
		Raised	**Normal**		
DURATION (yrs)	**1-2**	17	10	27	
		17.3%	22.7%	19.0%	0.03*
	2-3	50	29	79	
		51.0%	65.9%	55.6%	
	> 3	31	5	36	
		31.6%	11.4%	25.4%	
Total		98	44	142	
		100.0%	100.0%	100.0%	

*P-value is statistically significant

DISCUSSION:

The Metabolic syndrome is a risk factor for various morbidities including cardiovascular and cerebrovascular disorders [17].

In current series the CRP was found to be raised in 69% individuals had metabolic syndrome, of which females were seventy three and males were twenty five in proportions and are consistent to former study.[18] while no any gender difference was detected in another study [19]. However, Medina-Lezama J, et al observed that the syndrome was more predominant in female population [20]. The increase in the trend of obesity is again might be the major risk factor for metabolic syndrome as obesity is again common in female population [21-23].

The relationship between raised CRP and obesity in children and adult population is also studied formerly [24, 25]. The previous study was conducted on the patients with angina pectoris and revealed that CRP was elevated in relation to increase triglycerides, body mass index and hypertension [26 while another study shown that CRP is directly proportional to body mass index, hypertension and raised triglycerides and uric acid level [27]. Juhan-Vague I, et al [28] observed the increase CRP level in subjects with insulin resistance while another study detected

that the acute inflammatory markers as CRP and IL-6 are raised in individuals with metabolic syndrome. Yudkin JS et al [30] identified the positive association between CRP, TNF-α, IL6 and f a strong relationship of the MS with acute-phase markers, including CRP, fibrinogen, IL-6 and TNF-α in subjects with metabolic syndrome. In current series the 40-49 years age group was predominant and related to the former study [31]. In our study the female gender was predominant and similar finding reported in former literature [32, 33].

The metabolic syndrome is related to inflammatory process which acts as pathogenetic and plays a major role atherothrombotic process and responsible for increasing cardiovascular and cerebrovascular adverse events.

CONCLUSION: It is concluded that the inflammatory marker as C-reactive protein is found to be raised in metabolic syndrome (69%) and reveals the positive association with female predominance (74.4%).

REFERENCES:

1.Olufadi R, Byrne CD. Clinical and laboratory diagnosis of the metabolic syndrome. J Clin Pathol. 2008;61(6):697-706

2.Pothiwala P, Jain SK Yaturu S. Metabolic syndrome and cancer. Metab Syndr Relat Disord. 2009;7(4): 279-87.

3.Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. Lancet. 2005 Apr 16-22;365(9468):1415-28.

4.Lindsay RS, Howard, BV. Cardiovascular risk associated with the metabolic syndrome. Curr Diab Rep. 2004;4:63-8

5.Ahmed S, Ahmed SA, Ali N. Frequency of metabolic syndrome in type 2 diabetes and its relationship with insulin resistance. J Ayub Med Coll Abbottabad. 2010;22(1):22-7.

6.Basit A, Shera AS. Prevalence of metabolic syndrome in Pakistan. Metab Syndr Relat Disord. 2008;6(3):171-5.

7.Dehghan A, Kardys I, de Maat MP, Uitterlinden AG, Sijbrands EJ, Bootsma AH, A et al. Genetic variation, C-reactive protein levels, and incidence of diabetes. Diabetes. 2007;56 (3):872-8.

8.Ridker PM, Danielson E, Fonseca FA, Genest J, Gotto AM Jr, Kastelein JJ, et al. Rosuvastatin to prevent vascular events in men and women with elevated C-reactive protein. N Engl J Med. 2008;359(21):2195-207

9.Huffman FG, Gomez GP, Zarini GG. Metabolic syndrome and high-sensitivity C-reactive protein in Cubans. Ethn Dis. 2009 Spring;19(2):115-20.

10.Ridker PM, Wilson PW, Grundy SM. Should C-reactive protein be added to metabolic syndrome and to assessment of global cardiovascular risk? Circulation. 2004;109(23):2818-25.

11.Festa A, D'Agostino R Jr, Howard G, Mykka¨nen L, Tracy RP, Haffner SM. Chronic subclinical inflammation as part of the insulin resistance syndrome: the Insulin Resistance Atherosclerosis Study (IRAS). Circulation. 2000;102(1):42-7.

12.Dandona P, Aljada A, Chaudhuri A, Mohanty P, Garg R. Metabolic syndrome: a comprehensive perspective based on interactions between obesity, diabetes, and inflammation. Circulation. 2005;111(11):1448-54.

13.Park HS, Park JY, Yu R. Relationship of obesity and visceral adiposity with serum concentrations of CRP, TNF-alpha and IL-6. Diabetes Res Clin Pract. 2005;69(1):29-35.

14.Heinrich PC, Castell JV, Andus T. Interleukin-6 and the acute phase response. Biochem J. 1990;265(3):621-36.

15.Yudkin JS, Kumari M, Humphries SE, Mohamed-Ali V. Inflammation, obesity, stress and coronary heart disease: is interleukin-6 the link? Atherosclerosis. 2000;148(2):209-14.

16.Ford ES, Ajani UA, Mokdad AH; National Health and Nutrition Examination. The metabolic syndrome and concentrations of C-reactive protein among U.S. youth. Diabetes Care. 2005;28(4):878-81.

17.Palaniappan L, Carnethon M, Fortmann SP. Association between microalbuminuria and the metabolic syndrome: NHANES III. Am J Hypertens.2003;16(11 Pt 1):952-8.

18.Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA.2002;287(3):356-9.

19.Rami Helvaci M, Kaya H, Gundogdu M. Gender differences in patients with metabolic syndrome in coronary artery interventions. Med Glas (Zenica).2013;10(1):75-80.

20.Medina-Lezama J, Zea-Diaz H, Morey-Vargas OL, Bolaños-Salazar JF, Muñoz-Atahualpa E, Postigo-MacDowall M, et al. Prevalence of the metabolic syndrome in Peruvian Andean hispanics: the PREVENCION study. Diabetes Res Clin Pract.2007;78(2):270-81

21.Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999–2000. JAMA.2002;288(14):1723-27.

22.Maury E, Brichard SM. Adipokine dysregulation, adipose tissue inflammation and metabolic syndrome. Mol Cell Endocrinol.2010;314(1):1-16

23.Fröhlich M, Imhof A, Berg G, Hutchinson WL, Pepys MB, Boeing H, Muche R, et al. Association between C-reactive protein and features of the

metabolic syndrome: a population-based study. Diabetes Care.2000;23(12):1835-9.
24.Huffman FG, Gomez GP, Zarini GG. Metabolic syndrome and high-sensitivity C-reactive protein in Cubans. Ethn Dis.2009;19(2):115-20.
25. Iamopas O, Chongviriyaphan N, Suthutvoravut U. Metabolic syndrome in obese Thai children and adolescents. J Med Assoc Thai.2011;94 Suppl 3:S126-32.
26.Haverkate F, Thompson SG, Pyke SDM, Gallimore JR, Pepys MB. Production of Creactive protein and risk of coronary events in stable and unstable angina. Lancet.1997;349:462-66
27.Tracy RP, Psaty BM, Macy E, Bovill EG. Cushman M, Cornell ES, Kuller LH. Lifetime smoking exposure affects the association of C-reactive protein with cardiovascular disease risk factors and sublinical disease in healthy elderly subjects. Arterioscler Thromb Vasc Biol.1997;17:2167-76
28.Juhan-Vague I, Thompson SG, Jespersen J. Involvement of the hemostatic system in the insulin resistance syndrome: a study of 1,500 patients with angina pectoris. Arterioscler Thromb.1993.13:1865-73
29.Pickup JC, Mattock MB, Chusney GD, Burt D. NIDDM as a disease of the innate immune system: association of acute-phase reactants and interleukin-6 with metabolic syndrome X. Diabetologia.1997;40(11):1286-92.
30.Yudkin JS, Stehouwer CDA, Emeis JJ, Coppack SW. C-reactive protein in healthy subjects: associations with obesity, insulin resistance, and endothelial dysfunction: a potential role for cytokines originating from adipose tissue? Arterioscler Thromb Vasc Biol.1999;19:972-78
31.Tanchoco CC, Cruz AJ, Duante CA, Litonjua AD. Prevalence of metabolic syndrome among Filipino adults aged 20 years and over. Asia Pac J Clin Nutr.2003;12(3):271-6.
32.Schmitt AC, Cardoso MR, Lopes H, Pereira WM, Pereira EC, de Rezende DA, et al. Prevalence of metabolic syndrome and associated factors in women aged 35 to 65 years who were enrolled in a family health program in Brazil. Menopause.2013;20(4):470-6
33.Bentley-Lewis R, Koruda K, Seely EW. The metabolic syndrome in women. Nat Clin Pract Endocrinol Metab.2007;3(10):696-704.